

POLYMASTISM, WITH SPECIAL REFERENCE TO  
MAMMÆ ERRATICÆ AND THE DEVELOPMENT  
OF NEOPLASMS FROM SUPERNUMERARY MAM-  
MARY STRUCTURES. By W. ROGER WILLIAMS,  
F.R.C.S., *Surgeon to the Western General Dispensary,  
late Surgical Registrar, Middlesex Hospital.*

SECTION 1.

THE human breasts (*mammæ*), like those of all other Mammalia, are generally regarded as greatly enlarged and modified cutaneous sebaceous glands.

The observations of Dr Champneys<sup>1</sup> on the development of mammary functions by the axillary sebaceous glands of women during lactation, as well as those of Duval<sup>2</sup> on the nature of the secretion of the acinous glands of the areola under like conditions, show that the difference between sebum and milk is only one of degree.

In all this it appears to me there is nothing to countenance the extraordinary view recently advanced, that in human beings highly specialised organs like *mammæ* and teeth, which have taken immense ages to attain their present degrees of perfection, can be suddenly evolved, as "*sports*," from ordinary sebaceous glands and cutaneous epithelial processes respectively.

I must offer emphatic protest against this assumption, which is a contravention of the fundamental principle of *heredity*; and I shall presently show that the evidence on which it is based is altogether delusive.

Like all other glands opening on the free surface of the body, the mamma is developed from the columnar cells of the epidermis, by a process of continuously progressive ingrowing gemmation, with differentiation.

The question has arisen whether the mamma is to be regarded as the homologue of a single sebaceous gland, or of an aggrega-

<sup>1</sup> *Med.-Chir. Trans.*, vol. lxi. (1886), p. 419.

<sup>2</sup> *Du Mamelon et de son Auréole*, Thèse de Paris, 1861, p. 43.

tion of such glands. It appears to me that the only reliable guide in this matter is the ontogeny of the organ. Inasmuch as all observers are now agreed that the mamma is developed from but a *single* epithelial ingrowth; and that the form ultimately attained, in which the gland discharges by numerous ducts on the summit of the nipple, is due to secondary modification (kenogenesis): I am decidedly of opinion that the mamma is the homologue of but a single sebaceous gland.

The nipples (*mammillæ*)—papilla-like outgrowths adapted for being sucked—do not develop until after the glandular elements have been formed; and sometimes they never arise.<sup>1</sup> These ontogenetical phenomena are of great interest from the standpoint of phylogeny, because the lowest mammalian animals—the Monotremata—have no nipples. In them the milk simply emerges by numerous ducts, through a sieve-like perforated patch of the abdominal skin, from which the young animals have to lick it. These ducts open either on a flat surface (*Ornithorhynchus*), or into a pouch of the integument (*Echidna*). From this it may be inferred—inasmuch as the ontogeny of organs generally represents and accords with their phylogeny—that our mammalian progenitors had no nipples, though they had the glands.

The marsupials differ from the monotremes in possessing nipples. According to Darwin<sup>2</sup> these structures were first acquired by marsupials after they had diverged from and risen above the monotremes, and were by them transmitted to the placental mammals.

In human beings, at an early stage of development, the site where the nipple will subsequently appear is marked by a depression, towards the bottom of which the ducts of the gland converge. This rudimentary state may persist throughout life; such malformations are met with both in the normally placed and in the supernumerary nipples. They recall the mammary pouch of *Echidna*.

The further development of the nipple is effected by the

<sup>1</sup> Chambers, *Obstet. Soc. Trans.*, vol. xxi. (1879) p. 256; De Sinéty, *Traité de Gynécologie*. (1884), p. 946; Duval, *Op. cit.*, p. 98; Cruveilhier, *Traité d'Anat. Descript.*, ed. 1874, t. ii. p. 525; Davis, *Med. Times* (1852), vol. i. p. 250.

<sup>2</sup> *Descent of Man* (1879), p. 162.

area of skin perforated by the ducts, being raised up into the form of a papilla, above the level of the rest of the integument.

When the whole of the cutaneous area perforated by the ducts of the nascent gland is not integrated with the developing nipple, then such of the ducts as are left behind, instead of opening on the summit of the nipple, do so on the areola, where several of them are usually to be found, chiefly about the base of the nipple.<sup>1</sup> Thus the *glandulæ lactiferæ aberrantes* arise. From the frequency of these and other similar malformations, it may be concluded that the mammæ, like the lachrymal and salivary glands, are normally very imperfectly integrated organs.

## SECTION 2.

Human beings usually have but a single pair of mammary glands, which are situated on the ventral aspect of the thorax (*pectoral*), as in Apes, Bats, Elephants, and a few other mammals. This is the smallest number normally met with throughout the group. Most mammals have several pairs of such glands, situated at various points of the ventral surface of the trunk; and, as a rule, there is a certain relation between their number and the number of young brought forth at a birth, the former being twice as numerous as the latter.

In the insectivorous order, which yields the largest number, there may be as many as eleven pairs, and there are seldom fewer than seven. In these cases the glands extend along the whole length of the ventral surface, in two nearly parallel rows, from the axillary to the inguinal regions. I said *nearly* parallel, because the two rows converge towards the inguinal regions.

In the lowest mammalians (monotremes, marsupials, &c.)—which represent the primitive type—the mammæ are as a rule exclusively inguinal; in the highest class they are almost invariably pectoral; whilst animals with abdominal mammæ occupy an intermediate position.

In human beings any diminution of the normal number is very exceptional; but it is by no means uncommon to find their number increased. When this does occur, it is a significant fact that the additional mammary structures do not develop just

<sup>1</sup> Sappey, *Traité d'Anat. Descript.*, t. iv. (1874), p. 770.

anywhere; but they appear only in certain definite positions, which almost invariably correspond with those occupied normally by the glands of polymastic animals.

Such facts warrant us in attributing their origin to reversion; and they imply the existence in the past of a polymastic *atavus*, accustomed to produce several young at a birth.

The transition from polymastism to bimastism may now be seen going on in the Lemurs, whose inguinal and abdominal mammæ are aborting, so that only a single pair of pectoral ones tends to be well developed; and this change has evidently been induced by diminution of the number of young brought forth at a birth.

Similarly in many marsupials it has been observed that more nipples are found in the foetal than in the adult state: some of these structures atrophy, whilst others develop.

"On the whole," says Darwin,<sup>1</sup> "we may doubt if additional mammæ would ever have been developed in both sexes of mankind, had not man's early progenitors been provided with more than a single pair."

I think it would conduce much to a more complete understanding of the subject if I could give a sketch of the mammary arrangement of these early progenitors.

According to Meckel von Hemsbach, human beings originally had five mammæ: a pair corresponding to the normal pectoral ones, one in each axilla, and a median one just below the sternum.

I suppose the author must have based this idea of his on some cases he had seen, in which the glands really had this distribution; but I have been unable to find the record of any such case. Modern investigations have discredited this conception of Meckel's.

In the numerous well-recorded cases of supernumerary mammary structures now available, there are ample materials for reconstructing the mammary arrangement of the ideal human *atavus* on a really scientific basis. From this source it may be gathered that our early progenitors had at least seven pairs of mammæ on the ventral aspect of the trunk; of these only the present pectoral pair have survived. Of the six lost pairs, three

<sup>1</sup> *Op. cit.*, p. 37.

were situated above and external to the present normal pair, and three below and internal to them (fig. 1).

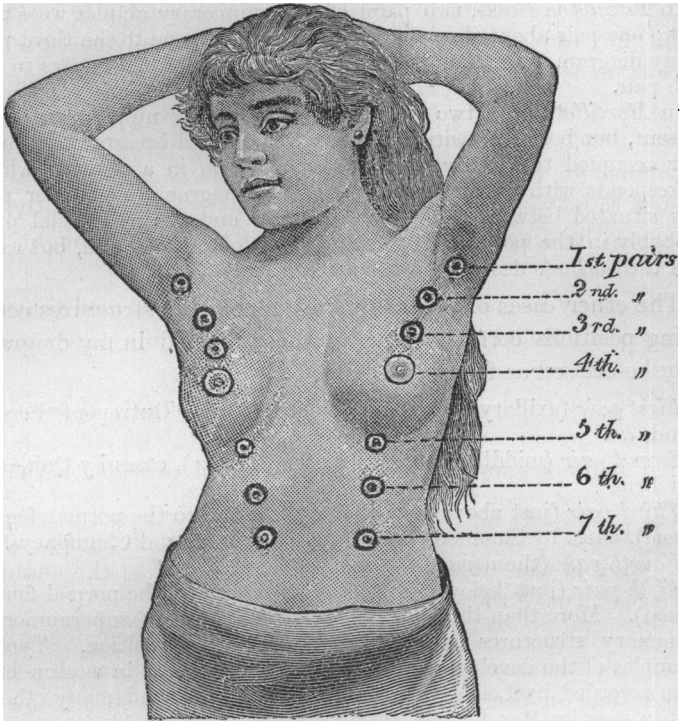


FIG. 1.—Diagram showing the mammary arrangement of man's early progenitors.

On careful consideration of all the facts known to me relative to the distribution of mammæ in human beings and animals under normal and abnormal conditions, I find it impossible to come to any other conclusion than that the mammæ were originally *segmental organs*—a pair being developed on the ventral aspect of each *somite*. In confirmation of this view the following cases may be cited:—

In *Neugebauer's* case, with eight supernumerary nipples, the largest number yet observed in any human being, three pairs were situated above the normal mammæ, in positions identical with those figured in my diagram. The other two nipples were situated below, and internal to the normal pair; that on the right side was placed imme-

diately below the bosom, that on the left side was some inches *lower down*. These unsymmetrical nipples must *not* be regarded as a pair; the upper one evidently represents the right nipple of the fifth pair of my diagram, and the lower one the left nipple of my sixth pair.

In *Fitzgibbon's* case, two pairs of supernumerary nipples were present; one pair above the normal *mammæ* correspond to the third pair of my diagram; and the other pair, below the normal, answers to my fifth pair.

In *Mortillet's* case, two pairs of supernumerary nipples were also present, but both were situated below the normal breasts; the lower pair occupied the upper part of the *abdomen*, in a position which corresponds with the seventh pair of my diagram; the upper pair was situated between the normal *mammæ* and the abdominal pair, probably in the position of the fifth pair of my diagram, but as to this the author's description lacks definition.

The other cases of supernumerary mammary structures occupying positions corresponding to those figured in my diagram, may be classed as follows:—

*First pair* (axillary), cases by Leichtenstern, D'Outrepoint, Perreymond, &c.

*Second pair* (middle of anterior axillary border), cases by Quinquad and Bruce.

*Third pair* (just above and slightly external to the normal female bosom), cases by Shannon (fig. 3), Lee, Gardiner, and Champneys.

*Fourth pair* (the normal *mammæ*).

*Fifth pair* (just below and slightly internal to the normal female bosom). More than three-fourths of all instances of supernumerary mammary structures have been found in this position. Typical examples of the development of this pair of *mammæ* in women have been recorded by Leichtenstern (fig. 2), Whitford, and many others; and in men by Max Bartels, Handyside, &c.

*Sixth pair* (below and slightly internal to the preceding, near the costal margin), cases in men by Leichtenstern and Hamy, and in women by Rapin, De Sinéty, &c.

*Seventh pair* (below and slightly internal to the preceding, on the upper part of the *abdomen*). Cases by Tarnier, Bartholin, and Bruce.

Further on details will be given of all the cases above referred to.

Supernumerary *mammæ* appearing in any of the above positions must, for the reasons before mentioned, undoubtedly be regarded as true reversions.

### SECTION 3.

It is an exceedingly rare thing for redundant mammary structures to be found in any other part of the body. Of 166

cases collected by Leichtenstern<sup>1</sup> and Bruce,<sup>2</sup> there were only four instances of this kind (*mammæ erraticæ*), and they are probably rarer even than this.

I now propose to examine these cases, and other similar ones since recorded, with a view to determining their real significance.

Considering the great similarity between the condition resulting from chronic fistula in connection with sebaceous and dermoid cysts that have undergone suppuration, which extends even to the production of a milk-like fluid, and several of the alleged cases of *mammæ erraticæ*, I think the latter ought to be very critically examined before they are definitively accepted as such.

These remarks are especially applicable to the two cases of so-called *dorsal mammæ*, of which the records are ancient and very imperfect. For instance, all the information we have of the case mentioned by Paulinus,<sup>3</sup> is as follows:—

“*Rustica fœmina e comitatu Winzemborch præter duas in loco ordinario adhuc duas alias ejusdem quantitatis et qualitatis mammas lacte fœcundas, habuit e regione in tergo. Jam tertia vice peperat, gemellos, qui ante retroque suxerunt.*”

The account of Helbig's<sup>4</sup> case is still more unsatisfactory.

“*B. Salewsky, nobilis Polonus, vir fide dignus in insula Macassar (veteribus celebres) mulierem vidit quæ mammas duas in dorso habens, eas sub axillis protractas infanti dabat et firmiter asserebat integro consanguinearum suarum numero hanc monstrositatem esse propriam.*”

It is very well for such cases to be in the mind of the artist, but until confirmed by modern observation they ought not to be admitted into the art itself.

In this connection it may be well to recal the fact that in a few animals the *mammæ* normally have a dorsal position; e.g., *Myopotamus coypus*<sup>5</sup> (near the dorsal spine), *Capromys*

<sup>1</sup> *Arch. f. Path. Anat.*, Bd. 73 (1878), s. 222.

<sup>2</sup> *Journal of Anatomy*, vol. xiii. (1879), p. 425.

<sup>3</sup> “*Obs. medico-phys. select.*” in the *Miscel. Curios. Acad. med. phys. nat. curios.*, an. iv. p. 203, in the appendix.

<sup>4</sup> *Op. cit.*, an. ix. and x. p. 456.

<sup>5</sup> *Proc. Zool. Soc.* (Christy), 1835, p. 182.

*fournieri*<sup>1</sup> (behind each axilla), and *Lagostomus trichodactylus* (dorso-lateral aspect of thorax).

Barth<sup>2</sup> has recorded a very remarkable case of alleged "*mamma erratica*" on the face.

The patient was a slender blonde, aged 20, who had, just in front of the lower part of her right ear, a peculiar wart-like growth surrounded by pigment and a few hairs. It was erectile, and looked very like a nipple. The patient said it generally enlarged during menstruation, and that it had existed as long as she could remember. She had a somewhat similar growth, which also enlarged during menstruation, above her nose; and several pigment spots on various parts of the face, as well as a large one at the lower edge of the right breast. The nipple-like growth on the face was excised. On *microscopic examination* it was found to consist chiefly of sebaceous gland tissue, which was *not* embedded in the subcutaneous fat. In several of the sections small epithelial pearls were seen, and cellular collections like small sebaceous cysts; as well as irregularly arranged groups of sweat glands, and bundles of unstriated muscle fibres. A few ducts were observed, but none could be traced to the nipple-like process. Waldeyer, who examined the histological preparations, advised giving no positive opinion as to the real nature of the disease; and the title of Barth's essay, *Eine eigenthümliche Warze nahe der Ohrmuschel*, suggests that the author himself was in doubt.

I have several times seen similar histological appearances in connection with congenital malformations of the skin of the face (warty moles); and I am inclined to regard the case as belonging to this category, rather than to that of "*mamma erratica*."

The case of accessory mamma *near the acromion*, recorded by Klob,<sup>3</sup> may be regarded as an unusual form of reversion; for, as Beddard<sup>4</sup> has shown, in *Hapalemur griseus*, mammae are of normal occurrence in this locality; as they are also in certain pachystomatous Cheiroptera.<sup>5</sup> In one of Champney's<sup>6</sup> cases, a lying-in woman had a supernumerary mamma in each axilla, the size of a pigeon's egg, which opened by a single pore at the middle of the anterior axillary fold. From the gland in the right axilla *a tail was prolonged down the arm for nearly an inch*.

Klob's patient was a man, and the supernumerary gland pre-

<sup>1</sup> Cuvier, G., *Leçons d'Anat. Comp.*, t. viii. p. 606 (leçon 38°).

<sup>2</sup> *Arch. f. Path. Anat.*, Bd. 112 (1888), s. 569.

<sup>3</sup> *Zeitschr. d. K. K. Gesellsch. d. Aerzte z. Wien* (1858), N.F.I., No. 52, s. 815.

<sup>4</sup> *Proc. Zool. Soc.*, 1884. p. 394. Although the specimen to which the description relates is a male, well-developed mammary glands were found to exist. The apertures of these glands were upon the upper part of the arm; and, on removing the skin, the glands themselves were found to be attached by membrane to the *pectoralis major*, the *biceps*, and part of the *deltoid* muscles.

<sup>5</sup> Milne-Edwards, H., *Leçons sur l'anat. comp.*, &c., t. ix. (1870), p. 132.

<sup>6</sup> *Op. cit.*, p. 434.



sented as a conical swelling, the size of a walnut, just below the left acromion, over the convexity of the deltoid muscle. It had a rudimentary nipple, but no areola. *Microscopic examination* revealed acinous gland tissue like that of the normal mamma.

Puech<sup>1</sup> refers to a case by Scalzi, from an Italian source, in which an aged woman, who was admitted into hospital for a scalp wound, was found to have a rudimentary supernumerary mamma on the right shoulder, near the axilla, and another below the left breast. Her daughter had a supernumerary milk-giving mamma.

An analogous case, in the lower limb, has been recorded by Robert of Marseilles.

The patient was a woman, aged 50, with a supernumerary milk-giving mamma on the outer side of the upper part of the left thigh, 4 inches below the great trochanter.

The case was examined and reported upon by Magendie,<sup>2</sup> for the French Academy of Science.

The real nature of the supernumerary gland was only discovered after her first confinement, when it attained the size of half a lemon, and secreted milk.

She had previously noticed in this situation, "un petit corps arrondi qui a toujours été le siège de douleurs et de démangeaisons, comme les seins mêmes aux époques de ses règles." The gland had a nipple, like the normal ones, so that she could suckle her children as well with it as with them. Strange to relate this woman's mother had a supernumerary pectoral mamma on the right side.

The position of the redundant gland in this case reminds us of the so-called *glandula femoralis* of the male *Ornithorhynchus*; of *Capromys fournieri*, which has, in addition to a mamma behind each axilla, two others "en avant des cuisses, tout à fait sur le côté et plus près du dos que du ventre;"<sup>3</sup> and of the *Mare* and *Ass*, which have the mammæ in the groins, far in front of the vulva.

Here also it seems tolerably certain that we have to do with an aberrant form of reversion.

The above case has often been erroneously cited as an example of *inguinal* mamma—a condition which, according to Leichtenstern, has never been observed in any human being.

Not long since, however, Blanchard<sup>4</sup> referred to an unpublished case of Professor Testut's, in which this anomaly was met with. It occurred in a woman in the lying-in hospital of Bordeaux. She had a true supernumerary mamma on the antero-internal aspect of the right thigh, a short distance below the fold of the groin. During lactation this gland increased in size and secreted milk freely. I have not met with the detailed account promised by M. Testut, but, for the sake of science, I hope it will be forthcoming.

As previously mentioned mammæ exclusively inguinal are typical

<sup>1</sup> Puech, *Les mamellis et leurs anomalies*, Paris, 1876, pp. 72 and 117.

<sup>2</sup> *Jour. Gen. de Méd.*, t. c. (1827), p. 57.

<sup>3</sup> Milne-Edwards, *Op. cit.*, p. 132.

<sup>4</sup> *Bull. de la Soc. d'Anthropologie*, t. viii. (1885), p. 230.

of the lowest mammalian orders. Among the highest orders rudimentary inguinal mammæ are occasionally present, as in the *Rhinolophidæ*, although all other Cheiroptera have long since lost all trace of their inguinal mammæ. In some Lemurs, in the Aye-Aye, and in many other animals, mammæ are of normal occurrence in the inguinal regions. The above case seems to indicate that in human beings reversion may occasionally reproduce this very ancient ancestral mammary arrangement.

Hartung's<sup>1</sup> case is evidently nearly allied to the foregoing. Here a supernumerary mamma was situated in the *left labium majus*. The patient, a woman aged 30, who was suckling her child, had a pedunculated tumour, the size of a large goose's egg, attached to the lower and inner part of the *left labium majus*. It was covered over with skin, and its pedicle was the size of a man's thumb. In front, at its upper part, there was an eroded ovoid patch, from which milk-like fluid escaped. The patient said she had noticed the tumour for several years; and that it had lately got much larger. It was freely excised with the pedicle, and during the operation a considerable quantity of milky fluid escaped.

On examination after removal, a flattened rounded prominence, like a retracted nipple, could be made out in the centre of the eroded area; and surrounding this was a shallow depression. At the summit of this prominence were several small orifices, some of which admitted a probe; they were ducts which radiated into the tumour substance. It was obviously a rudimentary malformed nipple, with its areola. The rest of the tumour consisted of two gland-like masses, the smaller one about the size of a walnut; on *microscopic examination* these were seen to be composed of acinous glandular structure, lined with sub-cylindrical epithelium, just like that of the normal mamma. In the region of the rudimentary nipple were numerous ducts lined with cubical epithelium. The pedicle consisted of fibro-fatty tissue and vessels. From the careful description given of this case it seems impossible to doubt that we here have to do with a true supernumerary mamma.

In most *Cetaceans* the mammæ normally occupy a somewhat similar position; and a little insectivorous animal (*Sorex crassicaudatus*), in addition to two pairs in the groins, has a third pair under the base of the tail, at the level of the anus.<sup>2</sup>

In three cases rudimentary mammæ have been found in the *median* line of the front of the body.

Gorré<sup>3</sup> refers to a Wallachian *vivandière*, the mother of two children, who died shortly after the birth of her second child from the effects of exposure and privation. On examining her body after death, Gorré was surprised to find a well-developed pair of supernumerary milk-giving mammæ, situated below and internal to the normal ones; and between these a rudimentary median one, five inches above the umbilicus.

<sup>1</sup> *Ueber einen Fall von Mamma Accessoria*, Inaug. Diss., Erlangen, 1875.

<sup>2</sup> Cuvier, *Op. cit.*, p. 606.

<sup>3</sup> *Dict. des. Sci. Méd.* (1819), t. xxxiv. p. 529.

Max Bartels<sup>1</sup> alludes to an instance of similar malformation in a man.

In the other case<sup>2</sup> an exceedingly beautiful lady, the mother of five well-formed children, had a small rudimentary median mamma rather below the level of the normal glands.

Median mammæ are very rare in the animal world; but instances occur in the Virginian Opossum (*Didelphys virginiana*), and in a few other marsupials.

From the foregoing remarks it will be gathered that I regard the so-called *mammæ erraticæ* as due to reversion to ancestral arrangements much more ancient than those reproduced in ordinary cases of polymastia.

There is no evidence whatever that such structures can arise just anywhere, as "sports," from ordinary sebaceous follicles; on the contrary, I have shown that they only arise in positions which correspond with those occupied normally by the glands of polymastic animals.

My investigations prove that highly specialised structures like the mammary gland, with its nipple and appendages, never develop suddenly in any human being, except in response to ancestral hereditary influence. Were it otherwise, human beings would have even more mammæ than Diana of Ephesus.

We know that supernumerary teeth, like supernumerary mammæ, are occasionally met with in mankind. But these redundant teeth do not occur just anywhere on the general cutaneous surface, but only in certain regions of the mouth hereditarily predisposed to reproduce them.

Supernumerary mammæ are frequently found on the general cutaneous surface of the front of the trunk, but teeth never. What is the reason of this? The answer is, that our remote ancestors were accustomed to have mammæ developed there, but not teeth.

It will be advanced as an objection to this reasoning that *supernumerary mammæ and teeth* have been found in the walls of ovarian dermoid cysts.<sup>3</sup> I willingly answer this objec-

<sup>1</sup> Reichert and Du Bois Reymond, *Arch. für Anat., &c.*, 1872, p. 306.

<sup>2</sup> Percy, "Mém. sur les femmes multimammæ," *Jour. de Méd. de Corvisart*, An. xiii., t. ix. p. 381.

<sup>3</sup> Corradi, A., *Dell Ostetrica in Italia*, Bologna, 1874, p. 1459; Haffter, E., *Arch. f. Heilk.* 1875, s. 56; *Arch. f. Path. Anat.* (Velitz), Bd. 107, s. 505; *Trans. Path. Soc. Lond.* (Sutton and Shattock), vol. xxxiv. pp. 437, 442.

tion, as it will afford me an opportunity of refuting the erroneous interpretation that has lately sprung up as to the origin of these remarkable anomalies.

The current view, which ascribes the origin of most ovarian dermoid cysts to sequestration of a portion of the cutaneous matrix, at an early stage of development, enables us to understand the presence of hairs, sebaceous follicles, sweat glands, and other normal dermal structures in the walls of such cysts.

Since it may very well happen, during the process of sequestration, that portions of the matrix of adjacent structures may also be involved, we can understand on this hypothesis how it is that connective and fatty tissues may be found in connection with such cysts, and even pieces of bone and cartilage.

But when in the walls of congenital ovarian cysts we find highly specialised structures, like mammæ and teeth, which are never produced in the normal ontogeny by any portion of skin likely to be thus sequestered, this hypothesis is, I maintain, no longer tenable.

In these cases, I believe, we have to do with very imperfect parasitic fetuses *per inclusionem*, in which only the mammæ or teeth of the parasite have survived.

Many examples<sup>1</sup> of this monstrosity have been recorded, in which only a single part or organ of the parasite has developed. In a case lately published by Kümmel,<sup>2</sup> there was only a rudimentary eye.

The cases of cows with udders on the back and supernumerary extremities also belong to this category.<sup>3</sup>

#### SECTION 4.

Mammary anomalies *per excessum* were formerly regarded as great rarities, because the old observers noticed only very

<sup>1</sup> Lannelongue, *Traité der Kystes Congénitales*, 1886, pp. 236-256.

<sup>2</sup> *Arch. f. Path. Anat.*, Bd. 118, Heft 1.

<sup>3</sup> Bugnion has recently described, in the *Revue Méd. de la Suisse Romande* (1889, p. 334), the case of a woman with a parasitic monstrosity, consisting of pelvis and lower extremities, which was attached by its rudimentary pelvis to her pubic region. In each groin she had a nipple-like process, surrounded by a pigmented area, which represented the mammæ of the *parasite*. The woman herself was otherwise well formed.

marked examples, to which their attention was usually drawn by the escape of milk from the tumour. Hence most of their cases were in women—pregnant or recently confined.

According to Bruce,<sup>1</sup> of 315 individuals of both sexes, taken indiscriminately, 7·6 per cent. presented the malformation; of 207 males, it was present in 9·1 per cent.; and of 104 females, in 4·8 per cent.

It is therefore nearly twice as frequent in males as in females.

Herein it resembles most other congenital malformations, which, as I have shown,<sup>2</sup> are much commoner in the male than in the female sex.

In this connection it is interesting to recall the observations of Darwin,<sup>3</sup> as to the great proneness of secondary sexual characters to vary, especially in males.

Supernumerary mammary structures very rarely attain the structural and functional completeness of the normal glands; as in the case of a woman described by Tarnier,<sup>4</sup> who had an extra pair of abdominal mammæ which equalled the normal ones in every respect.

It is usual to find the supernumerary organ represented only by a nipple—with or without its areola (true polythelia).<sup>5</sup>

In other instances there is neither nipple nor areola, but simply a subcutaneous mass of glandular tissue, which may communicate with the surface of the body by one or several pores, or be altogether cut off from it (true polymastia). Between these varying structural grades all kinds of intermediate conditions are met with.

In its least degree, the malformation *per excessum* is represented by the bifid nipple.

Duval<sup>6</sup> says, "I have seen a young woman, 25 years old, who had the nipple of each breast divided nearly to its base into two equal parts. She said her nipples had been thus from birth. The deformity did not interfere with lactation."

<sup>1</sup> *Journal of Anatomy*, vol. xiii. p. 423.

<sup>2</sup> *The Influence of Sex in Disease*, Churchill (1882), p. 4.

<sup>3</sup> *Descent of Man* (1879), p. 223 *et seq.*

<sup>4</sup> *Traité de l'art des Accouch*, Par Cazeaux, 8<sup>me</sup> ed. (1870), p. 86.

<sup>5</sup> Θηλή = nipple.

<sup>6</sup> Duval, *Du Mamelon et de son auréole*, Paris (1861), p. 90.

Slight exaggeration here leads to the formation of two nipples on one areola (intra-areolar polythelia), as in a case described and figured by Tiedemann.<sup>1</sup>

In this case the drawing was made from the body of a girl in the dissecting room, on each of whose otherwise well-formed breasts two nipples were found within one areola—one nipple perpendicularly below the other.

In other cases one or more supernumerary nipples, each with its own areola, are met with, in various positions, on a single being breast (intra-mammary polythelia).<sup>2</sup>

Percy and Laurent,<sup>3</sup> in their clever essay, have related a remarkable case of this kind. The patient was a woman who had two large pectoral mammæ in the normal position, of which the left was furnished with five nipples, each with its own areola, and the right with two nipples, also with distinct areolæ.

Prackel<sup>4</sup> saw a Scotch woman with three nipples on each breast, arranged so that they corresponded to the angles of an equilateral triangle, the two additional ones being below the normal nipple. Each of them gave milk. The woman had given birth to twins several times.

De Sinéty<sup>5</sup> and Tarnier<sup>6</sup> have each related a case of intra-mammary polythelia in women whose mothers had identical malformations.

A most remarkable instance of the inheritance of this deformity has been recorded by Blanchard.<sup>7</sup>

A man, the father of thirteen children—seven males and six females—had a supernumerary nipple with a rudimentary areola on each breast, a few cm. below each normal nipple (intra-mammary polythelia). All his seven sons had the like deformity, but none of his daughters. The youngest of the sons is the father of five children—four boys and one girl. All the boys have supernumerary nipples like their father, grandfather, and six uncles.

These anomalies arise from excessive growth of the rudiment of the gland and nipple, after the developmental process has made a certain amount of progress; consequently the causes which determine them must be referred to a much later stage

<sup>1</sup> Tiedemann and Treviranus, *Untersuchung über die Nat. der Mensch.*, &c. (1831), Bd. v. s. 110, taf. i. fig. 3.

<sup>2</sup> Duval, *Op. cit.*, p. 83 et seq.; Engeström, O., *Arch. de Gynéc.*, t. 31, p. 282; Chowne, *Lancet*, vol. ii. 1842, p. 465; Puech, *Op. cit.*, p. 84.

<sup>3</sup> *Dict. des Sci. Méd.* (1819), t. 34, p. 525.

<sup>4</sup> *Miscell. Curios. &c.*, Dec. ii., *Ann.* v., *App. Obs.* 67, p. 40.

<sup>5</sup> *Gaz. Méd. de Paris* (1887), p. 317.

<sup>6</sup> Cazeaux, *Traité de l'art des Accouch.*, 8<sup>e</sup> ed. (1870), p. 86.

<sup>7</sup> *Bull. de la Soc. d'Anthropologie*, t. ix. (1886), p. 485.

of embryonic development than those which determine atavistic supernumerary mammæ. That is to say, the causes of these malformations are of the same nature as those which originate *discontinuous growth* in general.

From such conditions, which are relatively rare, I will now pass to those much commoner ones, in which the supernumerary mammary structures are quite independent of the normal breasts.

The number of these supernumerary parts may vary from one to eight; but more than two are very exceptional.

Of Leichtenstern and Bruce's 166 cases, in 112, or two-thirds, there was only a *single* extra structure.

Such single redundant mammary structures are almost invariably situated a little below and internal to the corresponding normal mammæ, in the position of the fifth pair of my diagram (fig. 1); and they are much more frequently seen on the left than on the right side.<sup>1</sup> In women I have found that cancer<sup>2</sup> and other mammary neoplasms<sup>3</sup> have also a much greater predilection for the left than for the right mamma; but I have not observed the same disproportion in males.<sup>4</sup>

The like relation holds with regard to this anomaly, for on separating the sexes I have found that, of 42 males in Bruce's list, the deformity occurred on the left side in 22, and on the right in 20.

A small proportion of these single extra mammary structures are met with lower down than the above, in a position corresponding to that occupied by the sixth pair of my diagram. Both Leichtenstern and Bruce have recorded several such cases.

In the great majority of the remaining cases there was present a pair of supernumerary mammary structures, situated a little below and internal to the normal glands, in the position of the fifth pair of my diagram (fig. 1).

Typical instances of this kind in women have been recorded

<sup>1</sup> Of 101 single cases in Leichtenstern and Bruce's lists, 64 were on the left side, and only 37 on the right.

<sup>2</sup> *Middlesex Hospital Surgical Report* (1888), by the Author, p. 87.

<sup>3</sup> *Ibid.* (1889), Table v.

<sup>4</sup> *Lancet* (1889), vol. i. p. 262.

by Leichtenstern,<sup>1</sup> Whitford,<sup>2</sup> and many others; and in men by Bartels,<sup>3</sup> Handyside,<sup>4</sup> &c.

In Leichtenstern's case (fig. 2) the patient was a healthy young woman with a redundant pair of small, erectile, symmetrical nipples, each surrounded by a pigmented areola, situated just below and internal to the normal mammæ.



FIG. 2.

More than three-fourths of all cases of supernumerary mammæ have been found in this situation, on one or both sides.

We may conclude from this that our progenitors had a redundant pair of mammæ here long after they had lost all their other supernumerary glands.

In some *Lemurs* a similarly placed second pair of pectoral mammæ is still of normal occurrence.

In a certain number of cases a supernumerary *pair* of mammæ has been found below and internal to the above, in the position of the sixth pair of my diagram (fig. 1). Typical instances of

<sup>1</sup> *Arch. f. Path. Anat.*, Bd. lxxiii. s. 252, No. 87, taf. iv. fig. 4.

<sup>2</sup> *Chicago Med. Jour. and Examiner* (1884), p. 528.

<sup>3</sup> Reichert and Du Bois Reymond, *Arch. f. Anat.* (1872), s. 304.

<sup>4</sup> *Journal of Anat.* (1872), p. 56.



this kind in men have been recorded by Leichtenstern<sup>1</sup> and Hamy;<sup>2</sup> and in women by Rapin,<sup>3</sup> De Sinéty,<sup>4</sup> &c.

Abdominal mammæ in human beings are very rare. I know only of the following cases—

The most remarkable is Tarnier's.<sup>5</sup> He says, "I have myself seen a woman with four breasts, who died in the Maternity Hospital. Two breasts of the usual size occupied the normal position; while two others, as fully developed, were situated on the upper and lateral parts of the abdomen, nearly in the vertical line with the thoracic ones. At the necropsy I found abundance of glandular tissue in all four breasts, which also contained milk."

Bartholin<sup>6</sup> has seen a woman with a pair of supernumerary mammæ in the same situations, each the size of the normal male breast.

Bruce<sup>7</sup> has described and figured a redundant nipple in this situation in a man, and says he has seen several other instances of the kind.

In Mortillet's case, already alluded to, the patient was a young conscript with a pair of supernumerary mammæ in this situation nearly as perfect as the normal ones.

It seldom happens (12 out of 166 cases) that supernumerary mammary structures are met with *above* the normal glands. When this is the case, it is interesting to note that the redundant structures are always found *external* to the normal ones, as in polymastic animals. Cases of this kind will be cited in the section on axillary mammæ.

Probably all races of men are subject to these malformations; instances have been met with in nearly all European nations, and, in addition, in a Mongol, West Indian, Malayan, in a Mulattress from the Cape, a Moorish woman, and a Negress.

With regard to their occurrence in animals, Owen says:<sup>8</sup>—"In the Orang-utan (*Pithecus satyrus*), I have observed an accessory nipple on the left side, below the normal one, and of smaller size."

According to Sanson,<sup>9</sup> cows often have more than four teats,

<sup>1</sup> *Op. cit.*, s. 251 (No. 85), taf. iv. fig. 2.

<sup>2</sup> *Bull. de la Soc. d'Anthropologie*, t. 8 (1885), p. 229.

<sup>3</sup> *Rev. Méd. de la Suisse Romande* (1882), p. 472.

<sup>4</sup> *Gaz. Méd. de Paris* (1887), p. 317.

<sup>5</sup> Cazeaux, *Op. cit.* p. 86.

<sup>6</sup> *Epist. Méd.*, cent. iv. No. 38, p. 218.

<sup>7</sup> *Journal of Anatomy*, vol. xiii. (1879), p. 446.

<sup>8</sup> *Comp. Anat.*, vol. iii. p. 780.

<sup>9</sup> *Bull. de la Soc. d'Anthropologie*, t. ix. (1886), p. 511.

the supernumerary ones being always placed behind the normal ones; whereas in sheep, which are also prone to this anomaly, the additional teats are always found in front of the normal ones.

Daubenton<sup>1</sup> has described a goat with double teats on each udder; and Sutton<sup>2</sup> has met with instances of the deformity in various monkeys, cows, and other animals.

It may be inferred, with tolerable certainty, that all animals having normally but a few mammæ, are liable occasionally to have additional ones developed.

The question has been raised whether polymastic women are more liable than others to beget more than a single child at a birth. Of seventy polymastic women in Leichtenstern's list, three had given birth to twins, or 4·3 per cent; this proportion is much above the average, which for Great Britain is only about 1 per cent.

In polymastia the normal pectoral pair of mammæ are invariably present in their proper position, and well developed.

It is very unusual to find these anomalies associated with other congenital malformations, as in cases of amazia.

Bryant,<sup>3</sup> however, has seen a girl, aged six, with a supernumerary nipple on the left side, below the normal one, in whom the vagina was absent, and she had a clitoris as large as a boy's penis.

Voltaire<sup>4</sup> also relates having seen at a fair a woman with a pair of redundant mammæ, "qui portait de plus au croupion une sorte d'excroissance convertie de peau et de poils, la quelle ressemblait à une queue de vache."

It is alleged that in the beautiful Anne Boleyn, polymastism was associated with polydactylism.

Supernumerary mammæ are often hereditary. In seven out of ninety-two cases (7·6 per cent.) collected by Leichtenstern there was history of similar malformation in near relatives.

In Petrequin's case,<sup>5</sup> the father, his three sons and two daughters, each had a single supernumerary pectoral mamma.

Handyside<sup>6</sup> has seen two brothers, each with a supernumerary pair of pectoral nipples below the normal ones.

<sup>1</sup> Fourcroy's *Méd. éclairée*, t. v. tab. 12.

<sup>2</sup> *Internat. Jour. of Med. Sci.*, vol. xcvii. (1889), p. 247.

<sup>3</sup> *Diseases of the Breast* (1887), p. 9.

<sup>4</sup> *Dict. Philosophique*, art. "Monstres."

<sup>5</sup> *Gaz. Médicale*, av., 1837, p. 195.

<sup>6</sup> *Journal of Anatomy*, vol. vii. (1872), p. 56.

In a case related by Edwards,<sup>1</sup> a man had a single additional nipple, with areola below the right mamma, and his sister had a similar deformity of the left side. Edwards had the opportunity of examining both persons.

Bathurst Woodman<sup>2</sup> has recorded the case of a woman with a supernumerary nipple below the left breast, whose daughter had the like deformity.

Roberts' case has been already mentioned.

Other instances of hereditary polymastism have been recorded by Bartholinus,<sup>3</sup> Tiedemann,<sup>4</sup> and Scalzi.<sup>5</sup>

Anomalies of this kind are often overlooked for the want of knowing what to expect. Those who know *where to look* and *what to look for* are not likely to have much difficulty in making a diagnosis. In minor degrees of this deformity, instead of a redundant nipple, only a depression may be found (*athelia*). Hairs are never seen on normal nipples; but the supernumerary ones occasionally have them.<sup>6</sup> In many instances supernumerary mammary structures have been mistaken for moles, nævi, lipomata, and cold abscesses. Morbid growths in connection with the nipple sometimes stimulate supernumerary malformations. I lately saw a middle-aged married woman with a small *molluscum fibrosum* near the nipple, which it closely resembled.

I have already alluded to the resemblance between some cases of supernumerary mammæ and the condition resulting from chronic fistula, in connection with sebaceous and dermoid cysts that have undergone suppuration. Very little help is to be got from the metropolitan museums in this matter; altogether they contain but a single specimen! This *rara avis* is to be found in the museum of the London Hospital—a single supernumerary nipple from a man.

As a rule, supernumerary mammary structures, being small and rudimentary, hardly attract the notice even of those who bear them. Sometimes, however, especially in women during lactation, the overflow of milk from them causes considerable annoyance.

<sup>1</sup> *Phil. Med. News*, 1886, p. 264.

<sup>2</sup> *Obstet. Soc. Trans.* (London), vol. ix. (1867), p. 50.

<sup>3</sup> *Epist. Med.*, cent. iv., Hagæ Comitum, 1760; *Epist.* 38, p. 171.

<sup>4</sup> *Op. cit.*, s. 110.

<sup>5</sup> Puech, *Op. cit.* pp. 72 and 117.

<sup>6</sup> Bruce, *Op. cit.*

There can be no doubt as to the propriety of excising such redundant parts for those who desire to be relieved of the deformity, and the procedure is free from danger.

### SECTION 5.

The subject of supernumerary mammary structures in the axilla and its vicinity is of such great practical importance, that I propose to devote a special section to its consideration.

Several anatomists have recognised the fact that, in females, a process of the mammary gland is not infrequently prolonged round the border of the pectoralis major muscle into the axilla.

According to Hennig,<sup>1</sup> the fully developed female mamma has normally a tricuspid form, two of the cusps projecting towards the axilla, an upper and a lower one, and the other towards the sternum.

It is the upper of these two axillary mammary extensions that so often extends right into the axilla.

Though commonest in the axillary region, similar glandular offshoots have been found to arise from other parts of the breast. The connection of these out-lying lobules with the main gland is often reduced to a narrow pedicle, and not infrequently they are completely sequestered. In reference to this matter Sir Astley Cooper remarks:<sup>2</sup> "The margins of the breast do not form a regular disk, but the secreting structure often projects into the surrounding fibrous and adipose tissue, so as to produce radii from the nipple of very unequal lengths; hence a circular sweep of the knife cuts off many of its projections, spoils the breast for dissection, and, in surgical operations, leaves much of the disease unremoved."

Champneys<sup>3</sup> has related the following striking examples of this condition in lying-in women:—

1. On the third day after admission a mammary extension, two inches broad, was noticed in each axilla, to the apex of which it reached. These extensions joined the outer border of the mammary gland at a tangent; they felt nodular, and in all respects like the mamma itself.

<sup>1</sup> *Arch. f. Gyn.* Bd. ii. (1871), s. 331.

<sup>2</sup> *The Anatomy of the Breast*, London, 1840, p. 13.

<sup>3</sup> *Med. Chir. Trans.*, vol. lxix. (1886), p. 429.

2. On the sixth day after admission a mammary extension was felt on the inner wall of each axilla. These extensions were obviously connected with the breasts, and they felt just like them.

3. On the second day after admission there was noticed a nodular prolongation from the outer side of each mamma along the inner wall of the axilla, nearly to the apex.

No pore or nipple could be found in connection with any of the above extensions from which secretion could be expressed.

4 and 5. Charcot and Legendre<sup>1</sup> have, however, recorded two instances in which supernumerary nipples—in one case with and in the other without an areola—were met with in connection with axillary mammary extensions. Both the patients were women. In each there was but a single supernumerary nipple, which was situated just above and external to the normal one—in one case on the left side, and in the other on the right. In both these cases the connection between the supernumerary nipples and the mammary extensions was verified by *post-mortem* examination.

6. In Notta's<sup>2</sup> case there was a tumour the size of a walnut over the middle of the left anterior axillary border, which was connected with the breast by a narrow pedicle. On pressure milk escaped through a single small pore in the overlying skin. There was no sign of nipple or areola, and the other axilla was normal. The patient was a woman, aged twenty-six, who was suckling her fourth child. No escape of milk in the axilla had taken place during previous lactations. To account for this, Notta has made the feasible suggestion that on these occasions the secretion from the tumour was carried off by the normal nipple through the pedicle, which subsequently, for some reason or other, became occluded; when the accumulating secretion made its exit by the axilla. In order to determine the precise nature of this condition, Notta dissected the mammæ of a number of women. In one, aged twenty-six, who died in child-bed, he found an axillary mammary extension, which presented as—"Une sorte de cordon qui, suivant le bord externe du grand pectoral, remontait vers le milieu du deuxième espace intercostal."

7 and 8. Champneys<sup>3</sup> has seen two similar cases in lying-in women. In both there was supernumerary gland substance in each axilla, which discharged externally by a single pore at the middle of the anterior axillary borders.

We next come to a class of cases in which quite separate supernumerary mammæ have been found in these situations, *i.e.*, in positions which correspond to the 3rd pair of my diagram (fig. 1). I will cite four such instances.

1. In Shannon's case<sup>4</sup> (fig. 3) the patient was a woman, aged

<sup>1</sup> *Gaz. Méd. de Paris* (1859), p. 773.

<sup>2</sup> "Obs. de mam. surnuméraire," *Arch. de Tocologie*, 1882, p. 108.

<sup>3</sup> *Op. cit.*, pp. 430, 431.

<sup>4</sup> *Dublin Medical Journal*, vol. v. (1848), p. 266.

thirty-four, who came under observation soon after her sixth confinement, when it was noticed that she had a pair of supernumerary breasts just above and external to the normal ones (fig 3). Each of the redundant organs was the size of a large goose's egg. Curiously enough, the right supernumerary gland was furnished with two nipples, and the left with a single one; each nipple had its own well-developed areola, and during lactation milk flowed freely from them all, especially when the normal ones were being sucked. A mole-like body on the right supernumerary breast gave the appearance of a third nipple. The patient said she first noticed the supernumerary glands at about the time of puberty, and that they had always enlarged and given milk under the same conditions as the normal mammæ. She had never brought forth more than one child at a birth. The generative organs were normal. There was no history of any similar deformity among her relations.

2. Lee's patient<sup>1</sup> was a woman, aged thirty-five, in whom a pair of supernumerary mammæ were noticed shortly after her premature delivery of a still-born child. The redundant glands were situated just above and external to the normal ones; each had a single, small, flat nipple which yielded milk. She first noticed the deformity shortly after her first confinement ten years previously. She subsequently had several single children; and at thirty, she had twins. The generative organs were normal.

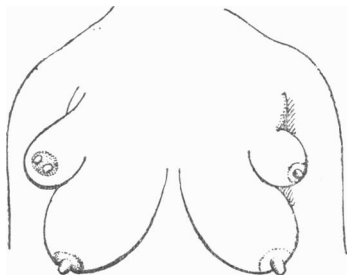


FIG. 3.

3. In Gardiner's case<sup>2</sup> the patient was a mulattress from the Cape, aged twenty-nine, healthy and well developed, except that she had a pair of supernumerary mammæ a little above and external to the normal ones. The redundant mammæ were smaller than the normal ones—about the size of those of a girl at puberty. After child-birth these glands enlarged, and gave milk.

4. Champneys<sup>3</sup> has observed in a lying-in woman a rudimentary nipple in the like situation just above the right breast. This woman had also an extra pectoral pair of nipples below and internal to the normal ones.

<sup>1</sup> *Med. Chir. Trans.*, vol. xxi. p. 266.

<sup>2</sup> Cited by Percy in his "Mém. sur les femmes multimammæ," *Journal de Méd., &c., de Corvisart.*, ann. xiii. t. ix. p. 383.

<sup>3</sup> *Op. cit.*, p. 434.

Several instances are on record of supernumerary mammary structures in a position above and external to that described in the foregoing cases, yet not in the axilla, but over the middle of its anterior border corresponding to the 2nd pair of my diagram (fig. 1). I can cite two cases of this kind:—

1. Quinquad's<sup>1</sup> patient was a woman, aged twenty-four, who, in addition to a large pair of normal mammæ, had another smaller pair situated above them, over the middle of each anterior axillary border. Each was the size of a small orange, and was furnished with well-formed nipple and areola. During lactation these glands gave milk. She had suffered from right internal strabismus since the age of two. There was no history of any malformations among her relatives. The areolæ of the normal mammæ were very large. Directly I saw her photograph this particular recalled to mind Cuvier's celebrated drawing of the Hottentot Venus,<sup>2</sup> whose areolæ were over four inches in diameter.

2. Bruce<sup>3</sup> has seen a man with a pair of rudimentary supernumerary nipples in the like position, who had also an extra nipple on the left side below the normal one.

The connection between pectoral and axillary mammæ is admirably illustrated by the three following rare cases of multiple mammæ:—

1. Fitzgibbon's<sup>4</sup> patient was a man, aged twenty-four, a native of Jamaica, who had four supernumerary mammæ: a well-formed pair below, and internal to the normal ones; and another rudimentary pair just above and slightly external to the normal ones.

2. In Mortillet's<sup>5</sup> case, two pairs of supernumerary mammæ were also present, but both were situated below and internal to the normal ones. The lowest pair was placed on the upper part of the abdominal wall, in the position of the seventh pair of my diagram (fig. 1); the other pair was situated between the foregoing and the normal pair, probably in the position of the fifth pair of my diagram, but as to this the description is not very precise. The patient was a healthy young conscript, and there was no history of any hereditary malformation in his family. The supernumerary mammæ were only a little less perfect than the normal ones. The lowest pair was the smallest.

3. Neugebauer's<sup>6</sup> case is remarkable for the large number of

<sup>1</sup> "Femme tétramaze," *Revue photographique des hôpitaux*, 1870, p. 16.

<sup>2</sup> "Femme de race boschismanne," *Hist. nat. des mammifères*, St Hilaire et Cuvier, t. i. (1824), p. 1.

<sup>3</sup> *Op. cit.*, p. 425.

<sup>4</sup> *Dublin Quarterly Journal of Medical Science*, vol. xxix. (1860), p. 109.

<sup>5</sup> *Bull. de la Soc. d'Anthropologie*, t. vi. (1883), p. 458.

<sup>6</sup> *Cent. f. Gynäk.*, 1886, p. 729.

supernumerary structures present, viz., eight, the largest number yet seen in any human being. This anomaly was met with in the person of a single woman of Warsaw, a domestic servant, who was admitted into the lying-in hospital for her second confinement. Her normal mammæ were large and well formed, and during lactation they gave an abundant supply of milk. Soon after her confinement, when suckling, she noticed an uncomfortable wetness in each axilla. On examination as to its cause, a supernumerary nipple without areola was found in each axilla, from which milk flowed freely when the child sucked either of the normal breasts. At the same time two other pairs of nipples, each with its own areola, were found above the normal ones. The upper pair was situated over the middle of each anterior axillary border; and the lower pair, just above the periphery of each bosom, and slightly external to the normal nipples. Shortly afterwards, on raising the pendent mammæ, two other unsymmetrical redundant nipples were found below and internal to the normal ones: that on the right side was immediately below the bosom, that on the left was some inches *lower down*. Neugebauer has spoken of these two unsymmetrical nipples as a *pair*; but it is quite clear to me that this is a mistake: the upper one evidently represents the right nipple of the fifth pair of my diagram, and the lower one the left nipple of my sixth pair (fig. 1). On pressure, milk escaped from all these redundant nipples. It is a curious fact that after her first confinement—seven years previously—she never noticed any abnormality about the chest, other than the presence there of several brown spots, which she took for moles. The patient was exhibited at a meeting of the Warsaw Medical Society. A woodcut, from a photograph, which accompanies the record of this case, makes it very complete.

I have found on record numerous cases of so-called axillary mammæ; but when one comes to examine these cases critically only three or four can be definitely accepted as such; most of the others are of the nature of axillary mammary extensions, and several of them were connected with the corresponding normal breast by a pedicle. I have not met with a single case of the kind in a male.

In animals axillary mammæ are rare, but they occur in the *Pteropi* (fruit bats) and in the flying lemur (*Galeopithecus*).

Of Leichtenstern's 105 cases of supernumerary mammæ, five were in the axilla (4·7 per cent.)

In a case observed and figured by this author,<sup>1</sup> there was a nipple the size of a split pea, without areola, at the top of the left axilla; and connected with it was a mass of gland substance the size of a walnut. The patient was a woman recently delivered of her first

<sup>1</sup> *Arch. f. Path. Anat., &c.*, Bd. lxiii. p. 245, No. 38, taf. iv. fig. 1.



child. When suckling, milk escaped from this nipple, as well as from another supernumerary nipple just below and internal to the left breast, though no gland substance could be felt beneath it.

A similar case has been recorded by D'Outrepoint.<sup>1</sup> The patient was a pregnant woman with a tumour the size of a hen's egg in the left axilla, connected with which was a nipple, whence colostrum escaped.

Perreymond<sup>2</sup> has related the case of a woman, aged twenty-seven, who shortly after her second confinement noticed a tumour the size of a pigeon's egg in the right axilla. It was movable, and not connected with the breast. Over it was a small nipple surrounded by an areola. On pressure milk escaped. The tumour was first noticed about the time of puberty at the age of fourteen. At her first confinement it was taken for an abscess. Six weeks after delivery the secretion ceased, and the tumour diminished in size.

These three cases and Neugebauer's are the only instances known to me of axillary nipple.

Champneys<sup>3</sup> has related the case of a lying-in woman with a supernumerary gland in each axilla the size of a nutmeg, connected with the normal gland by a narrow pedicle. On pressure, milk escaped from each axillary swelling through a small pore in the overlying skin.

Martin,<sup>4</sup> Siebold,<sup>5</sup> Champion,<sup>6</sup> Harris,<sup>7</sup> Dixon,<sup>8</sup> and Moore,<sup>9</sup> have each of them seen a lying-in woman with a tumour the size of a hen's egg in both axillæ, whence milk exuded on pressure through several small pores in the overlying skin. No nipple was present in either of these cases; nor is mention made of any connection between the axillary tumours and the normal mammæ.

In a case seen by Cameron,<sup>10</sup> a woman aged thirty-three, in her sixth lactation, had a tumour the size of a hen's egg in the left axilla, from which milk escaped on pressure through a single small pore. She first noticed the swelling after having over-exerted herself in extinguishing a fire when she was pregnant with her sixth child. In all her previous confinements she was free from any axillary trouble. It seems probable here, as in Notta's case, that the tumour was formerly connected with the normal gland by a pedicle, which carried off its secretion *per vias naturales*.

Cohn<sup>11</sup> has recorded a precisely similar case, also on the left side.

<sup>1</sup> *Neue Zeit. f. Geburtsk. &c.*, Hersang von Busch, &c., Bd. ix. (1840), S. 40.

<sup>2</sup> *L'Union Méd.*, 1874, t. 18, p. 864.

<sup>3</sup> *Op. cit.*, p. 423.

<sup>4</sup> *Annal. d'oculist et de gynéc.*, t. i. liv. 8.

<sup>5</sup> *Med. Ztg. v. e. Verein f. Heilk.*, in Pr., 1838, No. 6.

<sup>6</sup> *Dict. des Sci. Méd.*, t. xxx. p. 377.

<sup>7</sup> *Medical Times and Gaz.*, vol. i., 1861, p. 397.

<sup>8</sup> *Lancet*, vol. ii., 1843, p. 844.

<sup>9</sup> *Lancet*, 1838, p. 786.

<sup>10</sup> *Journal of Anatomy*, vol. xiii. (1879), p. 149.

<sup>11</sup> *Berlin Klin. Wochenschrift*, 1885, s. 291.

Matthews Duncan<sup>1</sup> has published an account of a woman, aged twenty-six, who, in the ninth month of her pregnancy, complained of constant wetness in the right axilla. Four days after her confinement a tumour the size of a walnut was found in this situation, which, on pressure, emitted milk through a single small pore in the overlying skin. The tumour had no obvious connection with the normal mamma.

Turney<sup>2</sup> and Hare<sup>3</sup> have met with precisely similar conditions in women, also on the right side.

In the cases of Harris and Hare milk cysts formed in the axilla.

## SECTION 6.

Very little has hitherto been recorded as to the development of neoplasms from supernumerary mammary structures.

Having made this subject the object of special investigations during many years, I have arrived at the following results:—

Of fifty cases of *Fibro-adenoma* of the mammary region consecutively under observation, I found that seven (14 per cent.) had originated in supernumerary mammary structures, quite outside the normal mammæ.

I append brief abstracts of these cases: <sup>4</sup>—

1. A well-formed, healthy, single woman, aged thirty-six, a cook had a hard, circumscribed, ovoid tumour, the size of a bantam's egg just above and external to the right bosom. There was no connection between the tumour and the mammary gland; and it was free from adhesions with the adjacent structures. The nipple and axillary lymph glands were normal. The patient said she first noticed a small lump in the site of the present tumour six months previously. There was no history of previous injury or disease of the part. Her mother died of cancer of the left breast. The catamenia had always been regular. During the last few years she had been subject to bilious dyspeptic attacks; but otherwise her previous health had been very good.

The tumour was dissected out. It was encapsuled and solid, and unconnected with the mamma. It presented to the naked eye the ordinary appearance of fibro-adenoma.

On *microscopic examination* acini and ducts were seen embedded in fibro-fatty tissue. The acini were arranged in grape-like clusters, as in the normal mamma; but most of their cells were in granular de-

<sup>1</sup> *Obstetrical Journal*, vol. i. (1873), p. 516.

<sup>2</sup> *Phil. Med. News*, 1886, p. 264.

<sup>3</sup> *Lancet*, vol. ii. (1860), p. 405.

<sup>4</sup> For further details, vide *Middlesex Hospital Surgical Reports* by the author, for the years 1882–1889.

generation, and in some places small cysts had formed. The ducts were seldom excavated, and their cells were also in granular degeneration.

2. A well-nourished single woman, aged thirty-eight, with a hard, movable, circumscribed tumour, the size of a large walnut, just above the right bosom. No enlargements of the adjacent lymph glands. Slight congenital retraction of both nipples. The tumour was first noticed three weeks previously. No injury or known cause for it. Catamenia always regular. Previous health good. Her father died, aged sixty-nine, of cancer of the stomach; and she has lost a sister with cancer of the breast.

The tumour was dissected out. It proved to be a typical, solid, fibro-adenoma, unconnected with the breast.

3. A pale, fair woman, aged twenty-six, with two small, hard, nodular tumours above the left bosom, and entirely unconnected with the gland. The nipple and adjacent lymph glands normal. The tumours of three months' duration. The patient had been twice married. By her first husband she had one child and two miscarriages. Her previous health had been good. She lost her mother of "internal tumour."

The tumours were dissected out. Each had the appearance of ordinary fibro-adenoma. On *microscopic examination* glandular acini in the resting stage were seen, surrounded by nucleated fibrous tissue, which contained a few spindle cells.

4. A healthy-looking woman, aged forty-three, who had on the axillary side of the left breast, and unconnected with it, a smooth, hard, movable tumour, the size of a walnut. No enlargement of the adjacent lymph glands. It was first noticed two months previously. Both nipples were congenitally retracted. Catamenia regular. The tumour was excised—a typical, solid, encapsuled fibro-adenoma.

5. A healthy woman, aged forty, with a hard, racemose tumour, the size of a walnut, over the edge of the sternum, on the left side, quite outside the mamma. It was first noticed three years previously. The patient had married at twenty-one, and had cohabited with her husband ever since, but she had never been pregnant. On examination of the tumour after removal, it was found to be an encapsuled, loculated fibro-adenoma. The loculi were full of papillary ingrowths. On *microscopic examination* fibro-adenoma—the intralocular growths consisted of fibrous processes lined with cubical epithelium.

6. A single woman, aged twenty-seven, a dressmaker, with a circumscribed tumour, the size of a hazel nut, over the edge of the sternum on the right side, and unconnected with the mamma. It was first noticed nine months previously. The tumour was dissected out; and it proved to be a solid ordinary fibro-adenoma.

7. A single woman, aged thirty-two, who had a firm, nodular tumour, the size of a walnut, just below and quite outside the left bosom. It was first noticed two years previously. Her sister had a similar mammary tumour. It was dissected out, and proved to be an ordinary solid encapsuled fibro-adenoma, unconnected with the mamma.

Very few instances of this kind have hitherto been described.

Cameron<sup>1</sup> has related two such.

The first was a single woman, aged thirty, who, five years previously, first noticed a lump the size of a walnut in her right axilla.

On examination, there was found in this situation an ovoid, elastic tumour, the size of a large cricket ball. It had been rather painful for the last two years.

The tumour was excised. There was no difficulty in the operation, because it was encapsuled, and readily shelled out. On section, after removal, it looked like a fibro-lipoma; but on *microscopic examination* it proved to be an ordinary fibro-adenoma.

In the second case the patient was also a single woman, aged thirty-three. She had a tumour, "the size of the fist, in the axilla." It had not increased in size since puberty. No operation was done.

In the Museum of University College Hospital I have found an interesting specimen of this disease, which is thus described in the Catalogue<sup>2</sup>:—"A large tumour removed from the mammary region. It is rounded in form, and measures 5 inches in its long diameter. Its surface is slightly lobulated, and it is enclosed in a loose capsule of areolar tissue. The section shows the tumour to be composed of closely packed lobules, bound together by a moderately abundant fibrous stroma. The resemblance to a section of the pancreas is almost perfect. There is one cyst, about half an inch in diameter, seen in the section. It has some fine papillary intra-cystic growths projecting into it. The tumour was removed by Quain from a lady, aged twenty-six, the mother of several children. It was first noticed eighteen months before operation; and during the last six months it had increased continuously. At the time of the operation the lady was six months pregnant. The tumour was on the left side, and did not implicate the mamma, which was quite free from it. After removal it weighed four pounds. On *microscopic examination* the tumour was seen to be composed of a structure closely resembling that of the normal mamma. Groups of acini were present, lined with abundant epithelium, which in some places quite filled them up. Here and there small ducts were seen which communicated with the acini; but no large ducts were seen which received the smaller ones. The inter-acinous tissue was very abundant, and consisted of mature fibrous tissue. No fat was found in any part of the specimen."

In dissecting a breast Eve<sup>3</sup> found a firm nodule, about the size of a hazel nut, lying near the axillary border of the right gland, but completely detached from it. On microscopic examination it consisted of large duct tubes lined with short columnar epithelium, which were in places enormously dilated. There were also present other smaller ducts, which ended in acini. These structures were embedded in fibrous tissue. The tumour was in almost all respects just like an accessory mammary glandule. The patient was a woman, aged fifty-

<sup>1</sup> *Journal of Anatomy*, vol. xiii., 1879, p. 150.

<sup>2</sup> Vol. ii., 1887, p. 445, No. 1960.

<sup>3</sup> *Brit. Med. Journal*, vol. i., 1883, p. 298.

nine, who died of bronchitis, after removal of epulis of the lower jaw. In addition to this tumour she had at the upper and inner part of each breast a small ordinary adenoma.

Sir Spencer Wells<sup>1</sup> refers to other cases of the kind in his Morton Lecture.

With regard to the development of *Cancer* in supernumerary mammary structures, I have the following observations to record.

Of 132 cases of cancer of the mammary region in women, consecutively under observation, I found that 13 (9·8 per cent.), had originated in supernumerary mammary structures, quite outside the normal mammæ.

I append brief abstracts of these cases.<sup>2</sup>

1. Single, aged fifty. Six months previously she first notice a lump in the sternal side of left breast. On examination, a hard nodular cancerous tumour, the size of a walnut, in this situation, quite outside the mamma. The overlying skin adherent; no obvious affection of the adjacent lymph glands. Amputation of the breast, and removal of the tumour with it. No history of tumour or cancer in the family.

2. Single, aged seventy-one. Seven years previously a hard nodule first noticed at the upper part of the chest, some distance above the left bosom. Six years ago the breast amputated, and the tumour removed. Recurrence at the primary seat five years later. No history of tumour or cancer.

3. Single, aged twenty-nine. Two years previously, first noticed a hard lump, the size of a pea, above the left bosom, and unconnected with the gland. In the course of four months it increased to the size of a marble. It was then excised; but the breast was left. Recurrence at the primary seat six weeks later; this again excised. Nine months later further recurrence in the same locality. On examination, a hard lump, the size of a brazil nut, above the left breast, over the 2nd intercostal space. The breast still quite free. Several small hard glands above and below clavicle. Just below the tumour, are the scars of the former operations. Axillary glands free. The recurrent disease again freely excised. She was convalescent twenty-four days later; and I have not seen her since. No history of cancer or tumour in the family.

4. Single, aged forty-five. Quite below the left breast, on its axillary side, is a hard, fixed, nodular tumour, with the overlying skin infiltrated and ulcerated. The disease was first noticed a year previously; when it presented as a lump the size of a hazel nut. The axillary glands enlarged. No history of cancer or tumour. Breast amputated; the tumour and axillary glands removed.

5. Aged fifty-four, married at forty-two, never pregnant. At lower

<sup>1</sup> Churchill, 1888, p. 22.

<sup>2</sup> For further details, vide *Middlesex Hospital Surgical Reports* by the author, for the years 1882-1889.

and axillary side of right breast, quite outside the gland, is a hard, knobby, rounded tumour, the size of a small orange. Nipple normal. Overlying skin adherent. Axillary glands enlarged. The tumour was first noticed one year previously. No history of cancer or tumour. Amputation of breast; removal of tumour and axillary glands.

6. Single, aged forty-six. Above the left breast, and on its inner side, is a hard, nodular tumour, the size of a bantam's egg, quite outside the mamma. Nipple normal. Overlying skin adherent. Axillary glands slightly enlarged. First noticed four months previously. Amputation of breast with the tumour, and removal of axillary glands. No family history of cancer or tumour.

7. Married, mother of three children, age fifty-one. Above the right bosom, over the middle of the anterior axillary fold, is a hard, nodular tumour, the size of a hen's egg, quite outside the mamma. The overlying skin adherent; the axillary lymph glands enlarged. Duration of tumour eighteen months. Removal of breast, tumour, and axillary glands. No family history of tumour or cancer.

8. Married, four children and one miscarriage, age sixty-seven. Three years ago first noticed a hard tumour at the sternal side of left bosom, unconnected with the gland. Three months later it was excised; but the breast was not removed. Recurrence set in, at the primary seat six weeks ago. On examination over the edge of sternum, on the left side, quite outside the mamma, is a tumour the size of a walnut, in the old scar. Nipple normal. No enlargement of axillary glands. Amputation of breast and removal of tumour.

9. Single, aged sixty-four. Over the edge of the sternum, on the left side, is a hard, rounded tumour, the size of an orange, firmly adherent to the adjacent structures. The lymph glands of left axilla enlarged. The patient says the disease began as a lump, quite outside the breast, eighteen months ago. No family history of cancer or tumour. No operation.

10. Single, age forty-nine. Four and a half years ago a hard lump first noticed quite outside the left bosom, near the axilla. A fortnight later, breast amputated and tumour removed. Recurrence at primary seat and in axilla two years later. Her sister died of cancer of the breast.

11. Married, six children, aged forty-seven. Above the left breast, over the edge of the sternum, is a hard tumour the size of a walnut, quite outside the bosom. It is adherent to the adjacent parts. Nipple retracted; axillary glands full. The patient says she first noticed a lump in site of present disease, outside the breast, two years ago. Amputation of breast and removal of tumour; axilla not touched. No family history of cancer or tumour.

12. Single, age sixty-two. Over the right edge of sternum, opposite the middle of the breast, but unconnected with it, is a hard tumour the size of an orange. The overlying skin is infiltrated; and the axillary glands are enlarged. The disease was first noticed two years ago as a tumour the size of a hazel nut, over the edge of the sternum. Congenital contraction of the nipple. No family history of cancer or tumour. Breast amputated, tumour removed, and axilla cleared.

13. Single, age sixty-nine. Pale and weak. Just beyond the periphery of the axillary part of the right bosom is a hard, nodular tumour, the size of a small orange. The overlying skin adherent; axillary lymph glands enlarged. Duration five years. Breast amputated, tumour removed and axilla cleared.

Among these 132 cases there were a few others, in which it seemed almost certain that the disease originated quite outside the mamma, but as I could not be quite sure of it I have omitted them.

With regard to the literature of the subject—

Foerster<sup>1</sup> has cited a case by Busch, in which cancer developed in a supernumerary mamma in the neighbourhood of the axilla. The breast was amputated and the axillary cancer was dissected out. On examination after removal, the mammary gland was found to be unconnected with the axillary tumour, and free from the disease. In connection with the cancerous tumour, some of the supernumerary axillary mamma still remained uninvaded by the disease. On *microscopic examination* this was seen to consist of glandular tissue, just like that of the normal mamma.

Gluck<sup>2</sup> has recorded an interesting case of the kind. The patient was a woman who for twenty-eight years had been affected with a hard, freely movable tumour, quite above the mamma. This swelling, after remaining stationary for many years, subsequently increased much, and presented all the appearances of cancer. The tumour was then excised, and it was evidently cancerous, as it recurred two years later. Here we have an adenoma developed from a supernumerary mammary structure; and from the adenoma cancer subsequently originated.

Billroth<sup>3</sup> mentions having seen acinous cancer develop in a breast with two nipples.

In the Hunterian Museum<sup>4</sup> is half a cancerous tumour, removed from the axilla of a lady, aged thirty-five. The breast and the skin over it were normal. It was easily detached. *Microscopical examination* revealed alveolar cancer. This is evidently a case of the kind we have been considering.

<sup>1</sup> *Die Missbild. der Mensch*, 1861, s. 49.

<sup>2</sup> *Berlin klin. Wochenschrift*, 1885, s. 292.

<sup>3</sup> "Die Krankheiten der Brustdrüsen," *Deutsche Chirurgie*, Lief. 41, 1880, s. 10.

<sup>4</sup> *Path. Catalogue*, vol. iv. p. 292, No. 4811A.